

What is claimed is:

1        1. A method for reducing sparkle artifacts in a liquid  
2        crystal imager, comprising the steps of:

3        low pass filtering only a first lower brightness level  
4        signal component of a video signal; and,

5        slew rate limiting only a second lower brightness level  
6        signal component of said video signal having said low pass  
7        filtered signal component,

8        said video signal having said low pass filtered and said  
9        slew rate limited signal components being less likely to  
10       result in sparkle artifacts in said imager.

1        2. The method of claim 1, comprising the steps of:

2        dividing said video signal into said first lower  
3        brightness level signal component and a higher brightness  
4        level signal component prior to said low pass filtering; and,

5        combining said low pass filtered first lower brightness  
6        level signal component and said higher brightness level signal  
7        component prior to said slew rate limiting.

1        3. The method of claim 2, comprising the step of delay  
2        matching said higher brightness level signal component with  
3        said low pass filtered lower first brightness level signal  
4        component prior to said combining step.

1        4. The method of claim 1, comprising the steps of:

2        dividing said video signal having said low pass filtered  
3        first lower brightness level signal component into said second  
4        lower brightness level signal component and a higher  
5        brightness level signal component prior to said slew rate  
6        limiting; and,

7        combining said slew rate limited second lower brightness  
8        level signal component and said higher brightness level signal

9 component to generate said video signal having said low pass  
10 filtered and said slew rate limited signal components.

1 5. The method of claim 4, comprising the step of delay  
2 matching said higher brightness level signal component with  
3 said slew rate limited lower brightness level signal component  
4 prior to said combining step.

1 6. The method of claim 1, comprising the steps of:  
2 dividing said video signal into said first lower  
3 brightness level signal component and a first higher  
4 brightness level signal component prior to said low pass  
5 filtering;

6 combining said low pass filtered first lower brightness  
7 level signal component and said first higher brightness level  
8 signal component prior to said slew rate limiting;

9 dividing said video signal having said low pass filtered  
10 first lower brightness level signal component into said second  
11 lower brightness level signal component and a second higher  
12 brightness level signal component prior to said slew rate  
13 limiting; and,

14 combining said slew rate limited second lower brightness  
15 level signal component and said second higher brightness level  
16 signal component to generate said video signal having said low  
17 pass filtered and said slew rate limited signal components.

1 7. The method of claim 6, comprising the step of  
2 supplying said video signal having said low pass filtered and  
3 said slew rate limited signal components to a liquid crystal  
4 on silicon imager.

1 8. The method of claim 1, comprising the steps of:  
2 applying said sparkle reducing steps to a luminance  
3 signal for said picture;

4       delaying chrominance signals for said picture; and,  
5       generating a plurality of video drive signals from said  
6 modified luminance signal and said delayed chrominance  
7 signals.

1       9. The method of claim 8, comprising the steps of:  
2       applying said sparkle reducing steps to at least one of  
3 said video drive signals; and,  
4       delaying all non-sparkle-reduced video drive signals.

1       10. The method of claim 1, comprising the steps of:  
2       generating a plurality of video drive signals from  
3 luminance and chrominance signals;  
4       applying said sparkle reducing steps to at least one of  
5 said video drive signals; and,  
6       delaying all non-sparkle-reduced video drive signals.

1       11. The method of claim 1, comprising the steps of:  
2       selecting different brightness thresholds for said first  
3 and second lower brightness level signal components in  
4 accordance with transitions between lower and higher level  
5 gain portions of a gamma table associated with said LCOS  
6 imager; and,  
7       selecting slew rate limits in accordance with the gain of  
8 said gamma table.

1       12. An apparatus for reducing sparkle artifacts in a  
2 liquid crystal imager, comprising:  
3       means for low pass filtering only a first lower  
4 brightness level signal component of a video signal; and,  
5       means for slew rate limiting only a second lower  
6 brightness level signal component of said video signal having  
7 said low pass filtered signal component,

8       said video signal having said low pass filtered and said  
9       slew rate limited signal components being less likely to  
10      result in sparkle artifacts in said imager.

1       13. The apparatus of claim 12, comprising:

2       means for dividing said video signal into said first  
3       lower brightness level signal component and a first higher  
4       brightness level signal component prior to said low pass  
5       filtering;

6       means for combining said low pass filtered first lower  
7       brightness level signal component and said first higher  
8       brightness level signal component prior to said slew rate  
9       limiting;

10      means for dividing said video signal having said low pass  
11      filtered first lower brightness level signal component into  
12      said second lower brightness level signal component and a  
13      second higher brightness level signal component prior to said  
14      slew rate limiting; and,

15      means for combining said slew rate limited second lower  
16      brightness level signal component and said second higher  
17      brightness level signal component to generate said video  
18      signal having said low pass filtered and said slew rate  
19      limited signal components.

1       14. The apparatus of claim 13, comprising:

2       means for delay matching said first higher brightness  
3       level signal component with said low pass filtered first lower  
4       brightness level signal component prior to said first-recited  
5       combining step; and,

6       means for delay matching said second higher brightness  
7       level signal component with said slew rate limited second  
8       lower brightness level signal component prior to said second-  
9       recited combining step.

1 15. The apparatus of claim 12, comprising:  
2 means for delaying chrominance signals for said picture;  
3 and,  
4 means for generating a plurality of video drive signals  
5 from a luminance signal having said low pass filtered and said  
6 slew rate limited signal components and said delayed  
7 chrominance signals.

1 16. The apparatus of claim 12, wherein:  
2 different brightness thresholds for said first and second  
3 lower brightness level signal components are selectable in  
4 accordance with transitions between lower and higher level  
5 gain portions of a gamma table associated with said imager;  
6 and,  
7 slew rate limits are selectable in accordance with the  
8 gain of said gamma table.

1 17. The apparatus of claim 12, wherein said means for  
2 low pass filtering has a normalized 1:2:1 Z-transform  
3 frequency characteristic.

1 18. The apparatus of claim 12, wherein said imager is a  
2 liquid crystal on silicon imager.

1 19. An apparatus for reducing sparkle artifacts in a  
2 liquid crystal imager, comprising:  
3 a low pass filter for processing only a first lower  
4 brightness level signal component of a video signal; and,  
5 a slew rate limiter for processing only a second lower  
6 brightness level signal component of said video signal having  
7 said low pass filtered signal component,  
8 said video signal having said low pass filtered and said  
9 slew rate limited signal components being less likely to  
10 result in sparkle artifacts in said imager.

20. The apparatus of claim 19, comprising:

a first decomposer for dividing said video signal into said first lower brightness level signal component and a first higher brightness level signal component prior to said low pass filter processing;

a first algebraic unit for combining said low pass filtered first lower brightness level signal component and said first higher brightness level signal component prior to said slew rate limit processing;

a second decomposer for dividing said video signal having said low pass filtered first lower brightness level signal component into said second lower brightness level signal component and a second higher brightness level signal component after said combining and prior to said slew rate limit processing; and,

a second algebraic unit for combining said slew rate limited second lower brightness level signal component and said second higher brightness level signal component to generate said video signal having said low pass filtered and said slew rate limited signal components.

21. The apparatus of claim 20, comprising:

a first delay match circuit for delaying said first higher brightness level signal component prior to said combining with said low pass filtered first lower brightness level signal component; and,

a second delay match circuit for delaying said second higher brightness level signal component prior to said combining with said slew rate limited second lower brightness level signal component.

22. The apparatus of claim 21, comprising:

2 a delay matching circuit for delaying chrominance signals  
3 for said picture; and,

4 a color space converter for generating a plurality of  
5 video drive signals from a luminance signal having said low  
6 pass filtered and said slew rate limited signal components and  
7 said delayed chrominance signals.

1 23. The apparatus of claim 19, wherein:  
2 different brightness thresholds for said first and second  
3 lower brightness level signal components are selectable in  
4 accordance with transitions between lower and higher level  
5 gain portions of a gamma table associated with said imager;  
6 and,  
7 slew rate limits are selectable in accordance the gain of  
8 said gamma table.

1 24. The apparatus of claim 21, wherein said low pass  
2 filter has a normalized 1:2:1 Z-transform frequency  
3 characteristic.

1 25. The apparatus of claim 21, wherein said imager is a  
2 liquid crystal on silicon imager.